collection of detailed epidemiological data. More information is therefore needed before it may be concluded that one and only one cause is operative, that one and only one condition is being dealt with, that this one cause will produce only this one condition, and that this condition may be produced only by this one cause, etc. It may all be a mare's nest, sheer coincidence, a syndrome brought about by diverse causes, the by-product of a sore throat or, possibly that rock of refuge, "intestinal flu."

Epidemiologists who feel that there is little left for investigation might do well to keep alert as to the occurrence of the winter vomiting disease in their communities. Here is a chance to assist in obtaining an answer as to whether or not this is a clinical entity. If it is, is it infectious and how; and what is the nature of the infectious agent?

LETTER TO THE EDITOR

TO THE EDITOR:

For some time now, I have cherished the opinion that the JOURNAL does not make statistical mistakes or indulge in bad statistical practice. I should like to comment, therefore, on a minuscule item on page 94 of the current January number, Vol. 33, Number 1. Under the heading "Epidemiologic Note" you quote an average incubation period of "12.2 plus or minus 1.1 days."

It is our practice to teach that the use of the $\pm$ following an average is distinctly undesirable, especially where it is not clear from the context what the number following the $\pm$ stands for. That number is usually the probable error of the average in question, although there are instances where it turned out to be the standard error. In either instance, I venture to say, the meaning of the $\pm$ term is not clear to the average reader, and for that reason it had best be avoided.

Referring to the article you cite in the *J.A.M.A.*, and without attempting to reconstruct the calculations based on the data presented, it may be assumed that the average of 12.2 days has a probable error of 1.1 days. Strictly this should be interpreted to mean that if the true average incubation period for *all* cases were 12.2 days, and if sets of observations similar to those presented could be made repeatedly, the averages could be expected to vary due to chance alone so that only 50 per cent of them would lie between $12.2 - 1.1$, or 11.1 days, and $12.2 + 1.1$, or 13.3 days. The remaining 50 per cent of the averages would be expected to lie outside of this range, i.e., below 11.1 days or above 13.3 days. Moreover, it is not known that the true average is 12.2 days, and by reasoning from the above it could easily be as low as 8.9 days or as high as 15.5 days (three probable errors below or above the observed average), assuming a normal distribution of incubation periods. In other words, if the true average were 8.9 days, the average of 12.2 days observed here could easily have occurred due to chance variation alone. Similarly if the true average were 15.5 days.

In a group of 37 cases therefore, one should not be surprised to find an average anywhere from three probable errors below the lowest likely true average to three probable errors above the highest likely true average, namely, between 5.6 days and 18.8 days. Unfortunately, very few readers would instinctively place this interpretation on the expression "an average of 12.2 ± 1.1 days." I believe it is safe to say that most per-

sons would simply conclude that the average may vary from 11.1 to 13.3, and no more, which would be incorrect.

In order to avoid misleading the uninitiated, I believe one should merely state that an average of 12.2 days was observed, and that this average had a standard error of 1.6 days (the figure from which a probable error of 1.1 days must have been derived). A careful reader would then make it his business to understand the meaning of "standard error." The use of the notation "±" followed by the value of one probable error does not convey the thoughts of modern statistical reasoning. It should be considered as out-of-date as the idea of keeping our screened windows shut tight at night in order to avoid malaria. I should like to suggest that the JOURNAL promote the education of the average reader in this respect as it does in so many other respects.

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